finding is consistent with the interpretation that they have passed one or perhaps even two glacial phases in the refugium. Lindroth found that a significant number of the Carabidae are represented by short-winged (flightless) populations; and he argues, as in previous studies, that this is a sign of a long-established fauna, since nonflying forms would not be able readily to extend their range. Such possible survivors, however, are few in number. Kodiak at present is well forested in parts, and livestock are raised; it corresponds mainly to Merriam's Hudsonian life-zone. More than nine-tenths of the flora and fauna are widespread species of a merely boreal type, which could not have persisted in the refugium but have evidently immigrated in postglacial times from ice-free Beringia or from the south. They testify rather to the ease of recolonization over great areas of land and even across sea channels of moderate width. The interpretation of the flightless Carabidae seems, to this reviewer, to remain doubtful; so many species of these beetles are polymorphic in wing development, and flightlessness is so frequent in arctic and alpine insects, that populations consisting entirely of flightless individuals may perhaps evolve readily when conditions warrant. Certainly, moreover, the Kodiak refugium, with its arctic conditions and limited biota, does little to clarify the hypothesis of coastal refugia supporting plants and insects of Hudsonian and Canadian type in glacial times, put forward by some authors to explain the present-day biota of Iceland and Greenland. On the whole, therefore, the book is interesting but a little disappointing; the conclusions are less decisive and less far-reaching than might have been hoped.

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Purines and Pyrimidines

Antagonists and Nucleic Acids. M. EARL BALIS. With a chapter by George B. Brown. North-Holland, Amsterdam; Interscience (Wiley), New York, 1968. xii + 294 pp., illus. $16.95. Frontiers of Biology, vol. 10.

In this volume Balis broadly reviews the synthesis of purines and pyrimidines, transcription and replication, and inhibitors of various types. In each of the chapters, information is presented from both a chemical and a biochemical point of view on inhibitors and antagonists of various reactions of nucleic acid synthesis, so that each chapter provides a summary of both synthetic and blocking reactions. Interconversions of purines and pyrimidines, subjects on which Balis has firsthand experimental information, are reviewed in considerable detail. Briefer reviews are presented of transcription and replication, the incorporation of analogs into nucleic acids, and the mechanisms of action by alkylating agents and inhibitors of protein synthesis. A novel feature of this book is the chapter written by Brown on purine-*N*-oxides, which he has actively studied. At present it would appear that these are of greater interest as carcinogens than as therapeutic agents. The bibliographies are interesting but not exhaustive.

This volume is an up-to-date account of an interesting aspect of biochemistry, and the material is presented so that it is readily comprehensible both to graduate students and to more advanced researchers.

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Physiological Controls

Physiology and Pathology of Adaptation Mechanisms. Neural, Neuroendocrine, Humoral. EÖRS BAJUSZ *et al.* Pergamon, New York, 1969. xvi + 584 pp., illus. $20. International Series of Monographs in Pure and Applied Biology: Modern Trends in Physiological Sciences, vol. 27.

This book is another collection of contributed chapters on a theme. In this case, the editor is Eörs Bajusz and the theme is adaptation to the environment. Sections of the book deal with neuroendocrine and metabolic regulatory processes, the regulation of pituitary-adrenal function, the regulation of the secretion of other pituitary hormones, adaptation to environmental temperature, and some examples of the regulation of other vegetative processes such as sleep. Thus, one can argue that the book, although valuable, fails to live up to its title; there is a good deal of physiology but very little pathology, and consideration is limited largely to those adaptation mechanisms that are neuroendocrine. The quality of the contributions and their makeup varies. A number of contributors use their chapters to report previously unpublished experimental data. For example, there are useful data and interesting hypotheses advanced in the chapters by Florsheim and by Slusher and Hyde. Other chapters are comprehensive reviews; one particularly complete and analytic review is that of Beyer and Mena on the control of lactation. The chapter by Norman on the cerebrospinal fluid as a possible transmitter mechanism is short and incomplete, but does raise some interesting questions. It is particularly pertinent in view of the current controversy about whether implants of glucocorticoids in the brain act locally to inhibit ACTH secretion or whether the dissolved steroids are transmitted via the cerebrospinal fluid to the median eminence and thence via the portal vessels to the pituitary.

The most recent original articles cited in many of the chapters are dated 1964 or 1965 and the foreword is dated 1966, yet the book was published in 1969. It seems to me that the speeding up of publication of reviews needs special attention, particularly in new fields in which concepts change and new data appear as rapidly as they do in modern neuroendocrinology. However, the present book will still be of interest, particularly as a source book, to those who are concerned with regulatory mechanisms and environmental physiology.

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Chemistry of Aging

Aging Life Processes. SEYMOUR BAKERMAN, Ed. Thomas, Springfield, Ill., 1969. xiv + 190 pp., illus. $9.75. American Lecture Series No. 729.

Bakerman and five contributors offer a competent, if superficial, review of the accomplishments of chemists interested in aging. More consideration of the relation of the chemical data to those of physiology and morphology would have enhanced the volume's readability, but much of the relevant chemical literature is reviewed. After a sketchy discussion of mostly nonchemical parameters, aging changes in nucleic acids and proteins are discussed, but with no mention of data from Hydén's laboratory showing age-

related changes in neuronal RNA. Three chapters concern, respectively, enzymes and cellular metabolism, connective tissues, and lipids and pigments, the last of these dealing mostly with basic principles of lipid metabolism while neglecting the literature on lipofuscin of the past five years. A useful compilation of gerontological theories concludes the text.

This volume may reflect the fact that aging is an underdeveloped biological discipline about which little is known. This is regrettable, if true, because the biology of aging should be a subject of prime social and medical significance today. In 1960 it was the concern of a White House conference. In 1967 its status and needs were investigated by a Senate Committee on Aging, and in 1968 the Preliminary Gerontological Research Act was introduced to the Senate. This bill (S. 870) was reintroduced on 4 February 1969. As yet it has received no action, or even any debate.

One consequence of this legislative inactivity is a lack of funds to support biologists and perpetuate interest in research on aging. A modest congressional effort now would help significantly to put such research in the mainstream of contemporary biology.

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Many-Body Effects

Tunneling in Solids. C. B. DUKE. Academic Press, New York, 1969. xii + 356 pp. illus. $16. Solid State Physics, supplement 10.

In this volume the author has undertaken the first systematic and critical review of tunneling in the literature. The theoretical study of electron tunneling between two conducting electrodes separated by an insulating barrier has a long history, dating back to the beginning of quantum mechanics, but, as the author's interesting historical commentary brings out, the experimental realization of conditions under which such tunneling could be observed dates back only ten years to the development of the tunnel diode by Esaki and the metal-oxide metal tunnel junction by Giaever.

The work of Giaever, undertaken to study superconductivity in the metal electrode, revealed what a powerful tool tunneling can be for studying the many-body effects that can occur in solids. It is this use of tunneling that is the main theme of Duke's book. The book divides itself into three main parts. In the first there is a discussion of the one-electron properties of tunneling junctions. One-electron tunneling in all types of junctions is reviewed, and a commendable effort is made to review critically both the experimental and the theoretical literature. With the one-electron properties of tunnel junction placed in perspective, the remaining two sections of the book are devoted to deviations from this behavior —that is, to many-body effects.

In the first of these sections a broad survey of the various manifestations of many-body effects, including barrier excitations, electrode self-energy effects, and superconductivity, is presented. This section may prove rather tough going for the graduate student who has not already had some introduction to tunneling theory, since the formal theory is not really developed until the last part of the book.

In the final section the transfer Hamiltonian approach to tunneling is developed and a critique of its limitations is given. Using this approach Duke introduces temperature-dependent diagrammatic perturbation theory to analyze the various tunneling processes that can occur. I find the treatment unnecessarily heavy at this point, for one is dealing with a linear response situation, for the understanding of which the full machinery of diagrammatic perturbation theory would seem unnecessary.

A number of the difficulties associated with the tunneling Hamiltonian have recently been cleared up, and as a result some of the statements made in this section that depend on ad hoc assumptions about the tunneling matrix elements, particularly as they pertain to electrode self-energy effects, are inaccurate. In addition we now have a clearer idea about the connection between electrode self-energy effects and assisted tunneling than that contained in this book.

Such, however, are the problems of writing in a rapidly developing field. On the whole, the book presents an exhaustive treatment of tunneling, both experimental and theoretical, of a sort that is unavailable in coherent form anywhere else in the literature.

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Assembling Conductors

Solenoid Magnet Design. The Magnetic and Mechanical Aspects of Resistive and Superconducting Systems. D. BRUCE MONTGOMERY. Interscience (Wiley), New York, 1969. xvi + 312 pp., illus. $13.95.

The production of magnetic fields more intense than can be produced by an array of magnetic dipoles requires that the experimenter arrange current-carrying conductors in some configuration about the space in which he wishes to create the field. He is faced with problems of how to arrange the conductors to achieve the optimum field from the current that they carry, how to support them against the forces of the magnetic field created, and how to cool the conductors so that the currents (and magnetic fields) can be sustained. Preferably, practical problems such as these should be handled for the scientist by an industry capable of providing him with "off the shelf" units equal to the best that he could build but enormously cheaper. Such industrial capability does not yet exist, but Montgomery's work will be invaluable in developing it. Meanwhile, the book will be indispensable to those researchers who must build their own equipment.

Montgomery deals with all three problems for air-core solenoids, treating with varying degrees of sophistication: (i) the relationships between coil shapes, current densities, and the resultant magnetic fields; (ii) the problems of cooling the conductors; and (iii) the problems of how to construct the coils so that they can be both supported and cooled. He also deals with the unique problems of superconducting and of pulsed solenoids.

This is the first book to my knowledge which deals in extensive detail with all the aspects of high-field coil design. It is authoritative and well written. No such book, of course, can satisfy the needs or the tastes of every potential reader. Montgomery's does provide very complete (and up-to-date) reference lists for the reader who needs additional material.

The book is design-oriented, and among the 400-odd equations are many indicated approximations suitable for various practical situations. These are supplemented by the 140-odd graphs and figures and numerous tables. The book will be highly valuable to all who must work with intense magnetic fields.

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